US EPA ARCHIVE DOCUMENT

DC Barcode : D197133 &
D197134, D197135,
D201515, D194073,
D194074

PC Code No :128501

MAY 26 1994

EEB Out :

To: Robert Taylor
Product Manager #25
Registration Division H7505C

From: Anthony F. Maciorowski, Chief
Ecological Effects Branch/EFED (H7507C)

Attached, please find the EEB review of...

Reg./File # :
Chemical Name : Sulfosate--a salt of Glyphosate
Type Product : Herbicide
Product Name : Dividend
Company Name : ZENECA AGRGOCHEMICALS
Purpose : Section 3 Reg for weeds--fruit and berry orchards
Action Code : 230 Date Due :
Reviewer : R. Hitch Date In EEB: 8 Apr 94

EEB Guideline/MRID Summary Table: The review in this package contains an evaluation of the following:

GDLN NO	MRID NO	CAT	GDLN NO	MRID NO	CAT	GDLN NO	MRID NO	CAT
71-1(A)						72-7(A)		
72-3(A)	429776-01	Y	73-3(A)			72-7(B)		
72-3(B)	429776-02	Y	72-3(B)			122-1(A)		
72-3(C)	430033-01	Y	72-3(C)			122-1(B)		
71-3			72-3(B)			122-2		
71-4(A)			72-3(B)			123-1(A)		
71-4(B)			72-3(C)			123-1(B)		
71-5(A)			72-3(F)			123-2		
71-5(B)			72-4(A)			141-1		
72-1(A)			72-4(B)			141-1		
72-1(C)			72-5			141-1		
72-1(C)			72-6			141-2		
72-1(D)						141-5		

Y=Acceptable (Study satisfied Guideline)/Concur
P=Partial (Study partially fulfilled Guideline but additional information is needed
S=Supplemental (Study provided useful information but Guideline was not satisfied)
N=Unacceptable (Study was rejected)/Nonconcur

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAY 26 1994

MEMORANDUM

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

SUBJECT: Transmittal of Section 3 Registration Environmental Safety Evaluation for Sulfosate

FROM: Anthony F. Maciorowski, Chief,
Ecological Effects Branch/EFED (H7507C)

5/25/94

TO: Robert Taylor, Product Manager #25
Registration Division (H7505C)

Please find attached said document in response to Barcode registration actions: D194073, D194074, D197133, D197134, D197135, and D201515. It is hoped that this evaluation is fully responsive. You may feel free to call Robert Hitch (305-5991) on my staff for more information.

Summary of Risk.

The toxicity and exposure data available at this time indicate no significant risk from the use of this chemical under the proposed label. Sulfosate is a salt of glyphosate which has an acceptable environmental record. As would be expected, Sulfosate is very toxic to terrestrial plants and drift to nontarget plants and endangered plants would be a concern except that the orchard owner must minimize drift to protect his own trees and berries. Additionally we have calculated runoff and that should also not pose a problem.

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100 Submission Purpose

100.1 Submission Purpose and Label Information

Sulfosate is a systemic herbicide which apparently dissociates to glyphosate in water. The registrant seeks registration for weed control in many types of nut and fruit orchards. The maximum application rate is 4 pounds a.i. per acre for weeds such as bermudagrass and fescue.

100.2 Formulation Information

Six pounds of glyphosate-trimesium per gallon.

100.3 Application Methods, Directions and Rates

The label calls for applications with booms, CDA (controlled droplet), shielded sprayers, hand-held and high-volume wands, lances, and orchard sprayers. The label calls for possible tank mixtures with several other herbicides including Goal, and Simazine.

100.5 Precautionary Statement

Keep out of lakes, ponds and streams. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing equipment wash waters.

In case of spill, ISOLATE the spill. Absorb spill with inert absorbent material such as clay or Fuller's earth. Sweep up used absorbent and place in an appropriate chemical waste container. Flush spill area with water. Observe all local, State and Federal laws and regulations regarding disposal, spill, cleanup, removal or discharge.

Caution must be taken when applying TOUCHDOWN@ nonselective foliar systemic herbicide to avoid drift or contact with nontarget plant species. Such contact may result in plant injury.

101 Hazard Assessment

Sulfosate dissociates in water to glyphosate which has an unusually good environmental record. In the current evaluation we have conducted runoff calculations with the PRELIM program which was

developed by Drs D. Jones and R. Parker of EFGWB. The LOC's calculated on the basis of runoff indicate that no hazard would be expected from this use pattern either to nontarget or endangered organisms.

101.1 Discussion

The applicator will be working between rows of highly valuable fruit trees. He will endeavor to reduce drift and harm to his trees.

101.2 Likelihood of Adverse Effects to Nontarget Organisms

Environmental Fate Information:

In water Sulfosate dissosiates to glyphosate which is presumably the herbicidal entity (Consultation with Kevin Poff, EFGWB and B. Rhodes, agronomist for Zeneca Corp.).

The following fate data are from the the Fate one-liner unless noted otherwise. Kevin Poff has been consulted.

Solubility in water -- Very soluble at 20 degrees centigrade.

Vapor pressure -- 4.00 E-7 Torr

Log Kow -- - 5

Koc for the glyphosate portion of the salt estimated at 6,475. This is based on the formula for Koc:

(Kd / % O.C.) X 100

% O.C. = % Organic Carbon.

We use the Kd value of 90 for Ray Silt mentioned in the EFGWB one-liner for Glyphosate. Dr. Dave Jones of EFGWB notes that this glyphosate value should represent the Kd of the phytotoxic anion portion of Sulfosate.

We also note that % O.C. is calculated as 0.58 X % Organic Matter. The organic matter content of the Ray Silt was 2.4%. An estimate of the Koc at 536,000 based on a Kd of 22 for Lintonia SdLm is disregarded as being out of apparent bounds (discussed with Kevin Poff).

Stable to hydrolysis at pH 5, 7, and 9 ppm.
Sulfosate is a salt consisting of the glyphosate anion and the trimethyl sulfonium cation.

T 1/2 for cation in loam was 192 days in one study but was <1 month in another. Apparently the cation was stable in another aerobic soil metabolism study.

Half lives of up to 300 hours have been measured for the anion, which presumably contains the glyphosate anion.

Runoff estimates using the PRELIM model are attached. The model assumes 10 hectares draining to a one hectare pond. A range of estimated half-lives in soil is used (2 and 30 days). This appears to make little difference in EEC's for in two meter deep pond which were 8.3 and 10.6 ppb respectively when based on 2 and 30 day half lives. We will use the conservative 10.6 ppb estimate consistently in this evaluation.

Terrestrial Effects

Bobwhite quail and Mallard duck LC50 > 5000 ppm (core studies from M. Rexrode 9 Aug 1983 review).

At the maximum label rate of 4.48 kg/h sulfosate did not adversely affect germination and emergence of soybeans, corn and eight other plants (Accession No. 411114-03).

In regard to avian dietary concerns, the 4 lb a.i/ acre would be equal to approximately 1000 ppm on short range grass as per Kenaga's nomograph.

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Levels of Concern for Terrestrial Animals

Organism	Use Rate (Exposure)	Risk Quotient	Level of Concern
Mallard Duck Bobwhite Quail LC50>>5000 ppm	4lbs/ai. (1000 ppm on short range grass) Assuming direct application	<Assumed to be less than 0.1	0.5 high risk 0.2 restricted 0.1 endangered species may be at risk No presumption of risk
For 10 terrestrial plants based on seed germination and seedling elongation. EC25> than 4 lbs/A Species included oats, corn, and soybeans. July 10, 1989 EEB Review.	4 lbs/A (0.19 lbs/A PRELIM runoff estimate)	<0.0475	1.0 high risk 1.0 endangered species No presumption of risk

Vegetative vigor EC25 values for six dicotyledon plant and four monocotyledon plants were determined. Observations 19 days after postemergent spraying indicated that the vegetative vigor EC25 for the 10 species ranged from 0.05-0.25 lb a.i./A. (See July 10, 1989 review). Drift to foliage is not expected so these values are not used in risk assessment.

Aquatic Effects

Representative toxicity data include the rainbow trout with a 96 hr LC50 of 603 mg/L and a NOEC of 320 mg/L.
(Accession 408938-05 Core).

A 4 day Tier-2 growth and reproduction study with Selenastrum capricornutum (alga) showed a EC50 of 21.6 mg/L nominal concentration. Accession No 411114-04 Core.

Levels of Concern for Aquatic Organisms

Organism	Use Rate (Exposure)	Risk Quotient	LOC and Risk Presumption
Selenastrum capricornutum EC50 21.6 mg/l	4 lbs/A (10.6 ppb)	4.9 x 10-4	1.0 High 1.0 Endangered species may be affected No presumption of risk to aquatic plants
Bluegill LC50 603 mg/l		1.8 x 10-5	0.5 High 0.1 Restrict 0.05 Endangered No presumption of risk to FW fish
Daphnia magna LC50 = 71 mg/l 9 Aug 83 EEB review		1.5 x 10-4	0.5 High 0.1 Restrict 0.05 Endangered No presumption of risk to freshwater inverte-brates

Summary of Effects to Nonendangered Organisms

No significant harm to nonendangered organisms is expected given the clean record of glyphosate (which is likely to be the only active moiety of Sulfosate) and the orchard owner's need to reduce drift. No LOC's were exceeded for terrestrial or aquatic animals.

101.3 Endangered Species Considerations

No harm to endangered species is expected. As a herbicide, sulfosate is quite toxic when sprayed on the foliage of terrestrial plants, but the orchard owner will not allow drift onto his trees and this will protect plants outside the orchard from drift. Levels of concern (LOC's) for endangered aquatic organisms were not exceeded. Since it has been demonstrated that the LC50 is greater than 5000 for birds, sulfosate is assumed to be essentially nontoxic to avian wildlife. Likewise sulfosate showed no demonstrable effects on seed germination and seedling elongation of ten terrestrial plants at four pounds per acre. Thusly sulfosate is considered to be essentially nontoxic to terrestial plants in the seed and seedling elonga-tion stage. This is the stage of terrestrial plants which might have been affected by runoff.

Endangered Species Summary

No impact to endangered species is expected.

101.4 Adequacy of Toxicity Data

No additional data requirements are levied on sulfosate in relation to this use pattern.

The following three studies were submitted by the registrant:

MRID No. 429776-01 was reviewed by KBN Engineering in regard to guideline requirement 72-3. The KBN analysis indicates that the 96 hr LC50 for the sheepshead minnow, Cyprinodon variegatus was >320 mg/l. The NOEC is 320 mg/l. This study is fully acceptable to the Agency.

MRID No. 429776-02 was a toxicity study of the pacific oyster Crassostrea gigas. The KBN reviewer estimated the 48 hr LC50 to be 115 mg/l. The NOEC was 54 mg/L. This study is fully acceptable to the Agency.

MRID 430033-01 is a Mysid, Mysidopsis bahia, 96-hr LC50. It was reviewed by KBN. KBN calculated the 96 hr LC50 to be 29 mg/l and the NOEC to be 16 mg/l. This study is fully acceptable to the Agency.

101.5 Adequacy of Labeling

Minimal impact to the environment should result from following the label guidance.

102 Classification

Sulfosate does not appear to be a candidate for restricted classification.

103 Conclusion

The use pattern as described in the label is acceptable to Ecological Effects Branch.

Robert K. Hitch, Reviewer, Robert K. Hitch 20 May 94
Ecological Effects Branch
Environmental Fate and Effects Division

Daniel D. Rieder, Section Head, 5-24-94
Ecological Effects Branch
Environmental Fate and Effects Division

Anthony, F. Maciorowski, Chief, Cover memo signed
Ecological Effects Branch
Environmental Fate and Effects Division

RUN No. 1 FOR SULFOSATE INPUT VALUES

APPLICATION RATE (LBS/ACRE)	HALF-LIFE (DAYS)	DAYS TO RUNOFF	SOIL KOC	SOLUBIL (PPM)
4.000	30.0	1.0	6475.0	*****

THE PRELIMINARY EEC VALUE IS 10.6 PPB

RUN No. 1 FOR SULFOSATE INPUT VALUES

APPLICATION RATE (LBS/ACRE)	HALF-LIFE (DAYS)	DAYS TO RUNOFF	SOIL KOC	SOLUBIL (PPM)
4.000	2.0	1.0	6475.0	*****

THE PRELIMINARY EEC VALUE IS 8.3 PPB